

WHAT IS CLAIMED IS:

1. A high-speed inverse discrete cosine transformation (IDCT) method, comprising:

- (a) searching all elements of a discrete cosine transformation (DCT) matrix for elements having values other than 0, in a predetermined order, when a total number of elements having values other than 0 is not greater than a predetermined critical value;
- (b) performing a two-dimensional (2D) IDCT on the elements having values other than 0 searched for in (a); and
- (c) performing 2D IDCT on the DCT matrix when the total number of elements having values other than 0 is greater than the predetermined critical value.

2. The method of claim 1, wherein (b) comprises:

- (b1) obtaining a respective partial value for each element of a restored matrix, which corresponds to the DCT matrix, by substituting variables in an IDCT formula with a respective value and respective coordinates of each element having a value other than 0 and respective coordinates of each element in the restored matrix; and

(b2) obtaining complete values for the elements of the restored matrix by summing up partial values obtained in (b1) for the elements of the restored matrix.

3. The method of claim 1, wherein in (c), 2D IDCT is performed on the DCT matrix using a high-speed IDCT algorithm, wherein the high-speed IDCT algorithm is one of Wang's algorithm, Chen's algorithm, Lee's algorithm, and AAN algorithm.

4. The method of claim 1 further comprising:

(a-1) obtaining the total number of elements having values other than 0 by counting the elements having values other than 0 during a run-length decoding process for a predetermined compressed file, which is performed before the searching of all elements of a discrete cosine transformation (DCT) matrix for elements having values other than 0.

5. The method of claim 1, wherein the predetermined critical value is set to be a maximum number of elements having values other than 0, at which a number of computations for element-wise IDCT is less than a number of computations for matrix-wise IDCT.

6. The method of claim 1, wherein the elements of the DCT matrix are sequentially searched in a zigzag manner starting with an element in a first column and a first row of the DCT matrix.

7. A high-speed IDCT apparatus, comprising:

an element searching unit which searches all elements of a discrete cosine transformation (DCT) matrix for elements having values other than 0 in a predetermined order, when a total number of elements having values other than 0 is not greater than a predetermined critical value;

an element-wise 2D IDCT unit which performs 2D IDCT on the elements having values other than 0 searched for by the element searching unit; and

a matrix-wise 2D IDCT unit which performs 2D IDCT on the DCT matrix when the total number of elements having values other than 0 is greater than the predetermined critical value.

8. The apparatus of claim 7, wherein the element-wise 2D IDCT unit comprises:

a partial value calculator which obtains a respective partial value for each element of a restored matrix, which corresponds to the DCT matrix, by substituting variables in an IDCT formula with a respective value and

respective coordinates of each element having a value other than 0 and respective coordinates of each element in the restored matrix; and

a complete value calculator which obtains complete values for the elements of the restored matrix by summing up partial values obtained for the elements of the restored matrix by the partial value calculator.

9. The apparatus of claim 7, wherein the matrix-wise 2D IDCT unit performs 2D IDCT on the DCT matrix using a high-speed IDCT algorithm, wherein the conventional high-speed IDCT algorithm is one of Wang's algorithm, Chen's algorithm, Lee's algorithm, and AAN algorithm.

10. The apparatus of claim 7 further comprising an effective element number calculation unit that obtains the total number of elements having values other than 0 by counting the elements having values other than 0 during a run-length decoding process, which is part of a decoding process for a predetermined compressed file and is performed before IDCT.

11. The apparatus of claim 7, wherein the predetermined critical value is set to be a maximum number of elements having values other than 0, at which a number of computations for element-wise IDCT is less than a number of computations for matrix-wise IDCT.

12. The apparatus of claim 7, wherein the elements of the DCT matrix are sequentially searched in a zigzag manner starting with an element in a first column and a first row of the DCT matrix.

13. A computer-readable recording medium for recording a computer program code for enabling a computer to provide a service of high-speed inverse discrete cosine transformation (IDCT), the service comprising:

- (a) searching all elements of a discrete cosine transformation (DCT) matrix for elements having values other than 0, in a predetermined order, when a total number of elements having values other than 0 is not greater than a predetermined critical value;
- (b) performing a two-dimensional (2D) IDCT on the elements having values other than 0 searched for in (a); and
- (c) performing 2D IDCT on the DCT matrix when the total number of elements having values other than 0 is greater than the predetermined critical value.

14. The computer-readable recording medium of claim 13, wherein (b) comprises:

- (b1) obtaining a respective partial value for each element of a restored matrix, which corresponds to the DCT matrix, by substituting variables in an

IDCT formula with a respective value and respective coordinates of each element having a value other than 0 and respective coordinates of each element in the restored matrix; and

(b2) obtaining complete values for the elements of the restored matrix by summing up partial values obtained in (b1) for the elements of the restored matrix.

15. The computer-readable recording medium of claim 13, wherein in (c), 2D IDCT is performed on the DCT matrix using a high-speed IDCT algorithm, wherein the high-speed IDCT algorithm is one of Wang's algorithm, Chen's algorithm, Lee's algorithm, and AAN algorithm.

16. The computer-readable recording medium of claim 13 further comprising:

(a-1) obtaining the total number of elements having values other than 0 by counting the elements having values other than 0 during a run-length decoding process for a predetermined compressed file, which is performed before the searching of all elements of a discrete cosine transformation (DCT) matrix for elements having values other than 0.

17. The computer-readable recording medium of claim 13, wherein the predetermined critical value is set to be a maximum number of elements having values other than 0, at which a number of computations for element-wise IDCT is less than a number of computations for matrix-wise IDCT.

18. The computer-readable recording medium of claim 13, wherein the elements of the DCT matrix are sequentially searched in a zigzag manner starting with an element in a first column and a first row of the DCT matrix.